| Notice of Allowability | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/669,663 | FUJIMOTO ET AL. | |
| | Examiner | Art Unit | |
| | Houshang Safaipour | 2627 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *02/21/2006*.

2. ☒ The allowed claim(s) is/are *3,5-28,30,32 and 33*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 10/11/00
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

JEROME GRANT II
PRIMARY EXAMINER

## EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of issue fee.

Authorization for this examiner's amendment was given in telephone interview with Thomas McKiernan (Reg. No. 37,889) on May 9, 2006.

2. The application has been amended as follows:

Claims:

1-2. (cancelled)

3. (Amended by Examiner) An image processing apparatus, comprising:

a background judgment device judging whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel on receipt of a multilevel image, wherein

the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel; and

a local binarization device locally binarizing the target pixel and outputting a binary image if it is judged that the target pixel is not the background pixel.

4. Cancelled

5. (Amended by the Examiner) The apparatus according to claim 3, wherein said local binarization device uses an amount which is calculated based on an average and a standard deviation of gray levels of pixels in the vicinity area of the target pixel as a binarization threshold for the target pixel.

6. (Original) The apparatus according to claim 5, wherein the amount which is calculated based on the average and the standard deviation of the gray levels of the pixels in the vicinity area of the target pixel is calculated based on a sum of the average and a constant-multiple of the standard deviation.

7. (Original) The apparatus according to claim 5, wherein the vicinity area of the target pixel is a rectangular area of N x N with a prescribed number of pixels N and the target pixel located at a center.

8. (Amended by the Examiner) The apparatus according to claim 3, wherein said background judgment device judges whether the target pixel is the background pixel, using a standard deviation of gray levels of pixels in the vicinity area of the target pixel.

9. (Original) The apparatus according to claim 8, wherein said background judgment device judges whether the target pixel is the background pixel under a background judgment condition of $\sigma < \sigma_{min}$ with $\sigma$ as the standard deviation in the vicinity area of the target pixel and a min as a prescribed constant.

10. (Amended by the Examiner) The apparatus according to claim 3, wherein said background judgment device judges whether the target pixel is the background pixel using a standard deviation of gray levels and a gray level difference of pixels in the vicinity area of the target pixel.

11. (Previously Presented) An image processing apparatus, comprising:

a background judgment device judging for each target pixel whether the target pixel is a background pixel on receipt of a multilevel image, and

a local binarization device locally binarizing the target pixel, judging which of a background and a stroke the target pixel belongs to, and outputting a binary image if it is judged that the target pixel is not the background pixel,

wherein said background judgment device judges whether the target pixel is the background pixel using standard deviation of gray levels and a gray level difference of pixels in a vicinity area of the target pixel, and

wherein said background judgment device judges whether the target pixel is the background pixel under a background judgment condition of $r = \sigma/\Delta g < r\ min$ with $\sigma$ as the standard deviation in the vicinity area of the target pixel, $\Delta g$ as the gray level difference in the vicinity of the target pixel and $r_{min}$ as a prescribed constant.

12. (Original) The apparatus according to claim 10, wherein said background judgment device judges whether the target pixel is the background pixel under a background judgment condition of $\Delta g < g_{min}$ with $\Delta g$ as the gray level difference in the vicinity of the target pixel and $\Delta g_{min}$ as a prescribed constant.

13. (Original) The apparatus according to claim 10, wherein the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel.

14. (Previously Presented) An image processing apparatus, comprising:

a background judgment device judging for each target pixel whether the target pixel is a background pixel on receipt of a multilevel image, and

a local binarization device locally binarizing the target pixel, judging which of a background and a stroke the target pixel belongs to, and outputting a binary image if it is judged that the target pixel is not the background pixel, wherein said background judgment device judges whether the target pixel is the background pixel using standard deviation of gray levels and a gray level difference of pixels in a vicinity area of the target pixel, and

wherein said background judgment device judges whether the target pixel is a background pixel using a combination of a background judgment conditions $\sigma<\sigma_{min}$, $r=\sigma/\Delta g < r_{min}$ and $\Delta g< \Delta g_{min}$ with $\sigma$ as the standard deviation in the vicinity area of the target pixel, $\Delta g$ as the gray level difference in the vicinity of the target pixel and $\sigma_{min}$, $r_{min}$ and $\Delta g_{min}$ as a prescribed constant.

15. (Amended by the Examiner) The apparatus according to claim 3, further comprising:

a line element restriction device executing a process of the obtained binary image based on a ratio of black pixels in a shape-fixed line element mask including the target pixel and outputting a binary image.

16. (original) The apparatus according to claim 15, wherein
said line element restriction device leaves the black pixels in the line element mask as black pixels if the ratio of black pixels In the line element mask is a prescribed ratio or more.

17. (original) The apparatus according to claim 15, wherein said line element restriction device converts all pixels in the line element mask Into black pixels if the ratio of black pixels in the line element mask is a prescribed ratio or more.

18. (original) The apparatus according to claim 15, wherein

said line element restriction device converts all pixels in the line element mask into white pixels if the ratio of black pixels in the line element mask is less than a prescribed ratio.

19. (original) The apparatus according to claim 15, wherein said line element restriction device uses a plurality of line element masks.

20. (Amended by the Examiner) The apparatus according to claim 3, further comprising:

a stroke separation device applying a partial pattern in a gray scale image corresponding to a black pixel joint element in the obtained binary Image and separating strokes of different gray levels.

21. (original) The apparatus according to claim 20, wherein said stroke separation device judges whether to perform a stroke separation using one of an inter-class dispersion and a dispersion ratio between different strokes.

22. (Amended by the Examiner) The apparatus according to claim 3, wherein

said local binarization device judges which of the background and the stroke a pixel, which is judged to be the background pixel by said background judgment device, belongs to based on a gray level of the pixel.

23. (Amended by Examiner) An image processing apparatus, comprising:

judging for each target pixel whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel on receipt of a multilevel image, wherein

the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel; and

locally binarizing the target pixel and outputting a binary image if it is judged that the target pixel is not the background pixel.

24. (original) The method according to claim 23, further comprising: processing the obtained binary image based on a ratio of black pixels in a shape-fixed line element mask including the target pixel; and outputting a binary image.

25. (original) The method according to claim 23, further comprising: binarizing a partial pattern in a gray scale image corresponding to a black pixel joint element in the obtained binary image; and separating strokes of different gray levels.

26. (Amended by Examiner) a computer-readable storage medium on which is recorded a program for enabling a computer extracting a stroke included in an inputted multilevel image to perform a process, said process comprising:

judging for each target pixel whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel on receipt of a multilevel image, wherein

the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel; and

locally binarizing the target pixel and outputting a binary image if it is judged that the target pixel is not the background pixel.

27. (original) The storage medium according to claim 26, said process further comprising:

processing the obtained binary image based on a ratio of black pixels in a shape-fixed line element mask including the target pixel; and outputting a binary image.

28. (original) The storage medium according to claim 26, said process further comprising:

binarizing a partial pattern in a gray scale image corresponding to a black pixel Joint element in the obtained binary image; and separating strokes of different gray levels.

29. (cancelled)

30. (Amended by the Examiner) An image processing apparatus, comprising: Input means for receiving a multilevel image; and

background Judgment means for Judging whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel; wherein

the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel;and

local binarizatiod means for locally binarizing the target pixel and outputting a binary image if it is judqed that the target pixel is not the background pixel.

31. (cancelled)

32. (Amended by the Examiner) A transmission signal transmitting to a computer, which extracts a stroke included in an inputted multilevel image, a program for enabling the computer to perform a process, said process comprising:

judging for each target pixel whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel on receipt of a multilevel image, wherein

the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and an average gray level of black pixels in the vicinity area of the target pixel; and

locally binarizing the target pixel and outputting a binary image if it is judged that the target pixel is not the background pixel.

33. (Previously Presented) an image processing method, comprising:

receiving a multilevel image;

measuring an average gray level of white pixels in the vicinity area of the target pixel of the multilevel image;

measuring an average gray level of black pixels in the vicinity area of the target pixel;

calculating a gray level difference based on a difference between the average gray level of white pixels and the average gray level of black pixels in the vicinity area of the target pixel; and

judging whether the target pixel is a background pixel using the gray level difference and a standard deviation of gray levels of pixels in the vicinity area of the target pixel.

Houshang Safaipour
May 10, 2006

JEROME GRANT II
PRIMARY EXAMINER

1. **Reasons for Allowance**

Claims 1, 2, 4, 29 and 31 are cancelled.

Claims 3, 5-28 and 30, 32 and 33 are allowed.

This is examiner's statement of reasons for allowance.

Claims 3, 5-10, 12, 13, 15-28, 30, 32 and 33 are allowed for the reason that the prior art either singularly or in combination does not teach, an image processing apparatus, comprising:

a background judgment device judging whether a target pixel is a background pixel using a gray level difference and a standard deviation of gray levels of pixels in a vicinity area of the target pixel on receipt of a multilevel image wherein the gray level difference is an amount which is calculated based on a difference between an average gray level of white pixels in the vicinity area of the target pixel and average gray level of black pixels in the vicinity area of the target pixel.

Claim 11 is allowed for the reason that the prior art either singularly or in combination does not teach an image processing apparatus, comprising:

a background judgment device judging for each target pixel whether the target pixel is a background pixel on receipt of a multilevel image where the background judgment device judges whether the target pixel is the background pixel under a background judgment condition of $r = \sigma/\Delta g < r_{min}$ with $\sigma$ as the standard deviation in the vicinity area of the target pixel, $\Delta g$ as the gray level difference in the vicinity of the target pixel and $r_{min}$ as a prescribed constant.

Claim 14 is allowed for the reason that the prior art either singularly or in combination does not teach an image processing apparatus, comprising:

a background judgment device judging for each target pixel whether the target pixel is a background pixel on receipt of a multilevel image where the background judgment device judges whether the target pixel is the background pixel using a combination of a background judgment conditions $\sigma<\sigma_{min}$, $r = \sigma/\Delta g < r_{min}$ and $\Delta g<\Delta g_{min}$ with $\sigma$ as the standard deviation in the vicinity area of the target pixel, $\Delta g$ as the gray level difference in the vicinity of the target pixel and $\sigma_{min}$, $r_{min}$ and $\Delta g_{min}$ as a prescribed constant.

The features identified, in combination with other claim limitations, are neither suggested nor discussed by the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

2. ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Houshang Safaipour whose telephone number is (571)272-7412. The examiner can normally be reached on Mon.-Thurs. from 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached on (571)272-7437. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Houshang Safaipour
Patent Examiner
Art Unit 2625
May 10, 2006

JEROME GRANT II
PRIMARY EXAMINER